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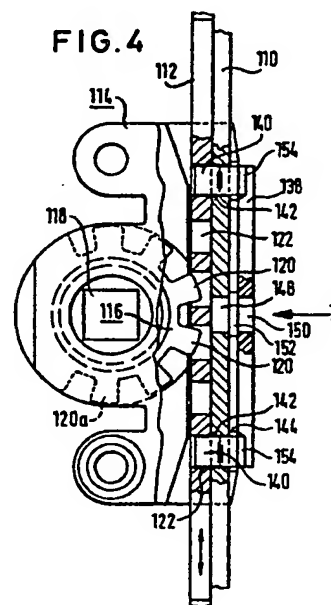
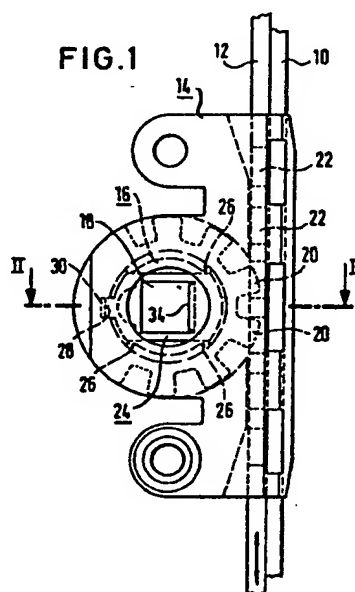
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(54) **A drive mechanism for a closable opening such as a window or a door**

(57) A drive mechanism for a window or a door, of the type comprising a drive pinion (16, 116) meshing with a rack in the form of an apertured drive rod (12, 112) guided in a guide rail (10, 110) is disclosed, in which, in order to secure the movable components (12, 112, 16, 116) in a preliminarily selected position, for example, a centralised position, securing means (24, 140) are provided. In one embodiment the securing means comprise a slide plate (24) carried by the pinion (16) and having a projection (28) for engagement in a cooperating recess (30) in the pinion housing, from which it can be disengaged upon insertion of a key (36) for turning the pinion.

In another embodiment, a shear pin (140) engages into one of the apertures (122) of the drive rod and is braced against the guide rail (110) and/or against the mechanism housing (114), and is ejected into the open by a tooth (120a) of the pinion (116) after shearing off has occurred by turning the pinion.



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FIG. 1

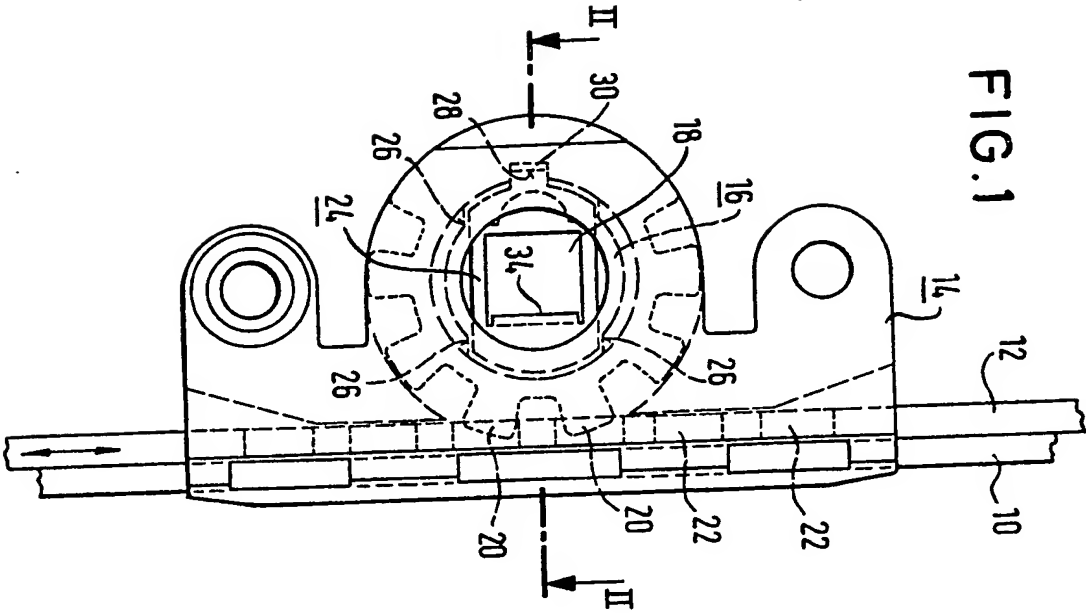


FIG. 2

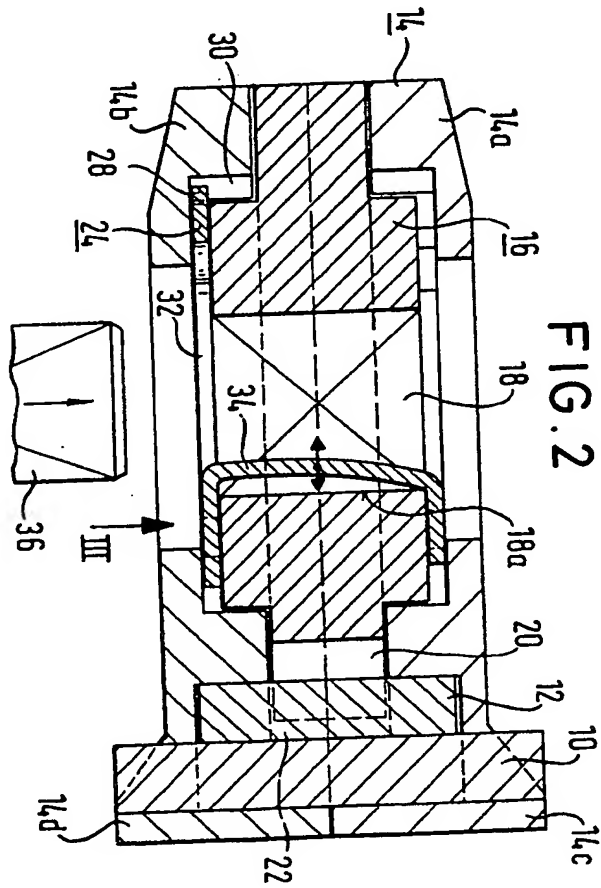
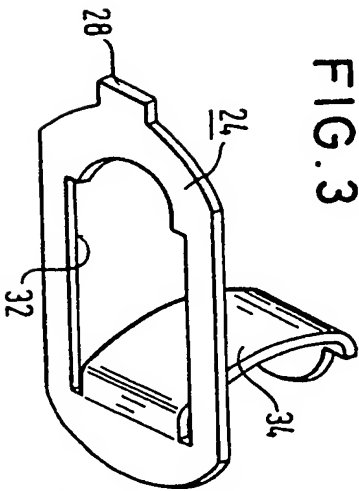
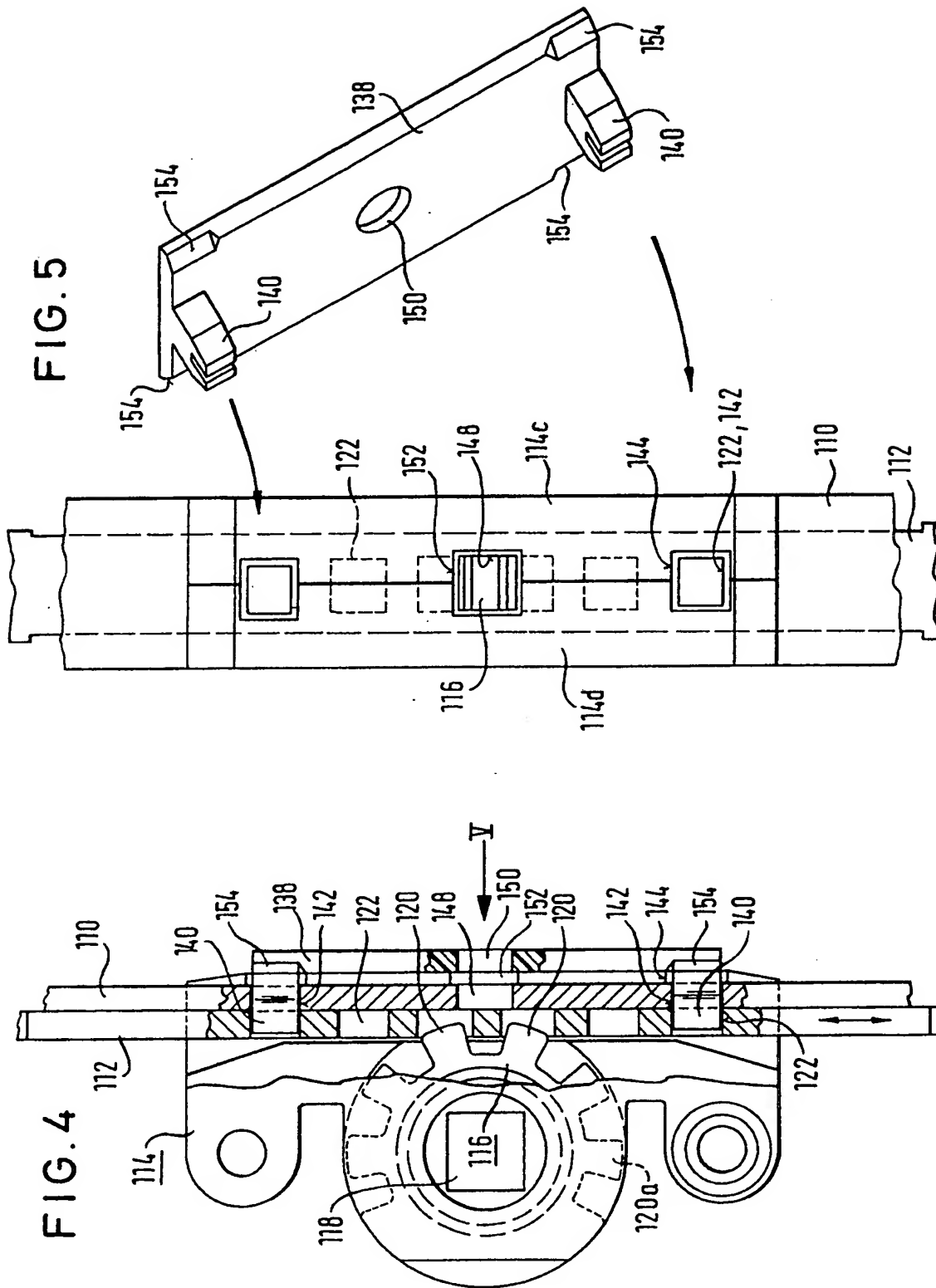


FIG. 3





SPECIFICATION

A drive mechanism for a closable opening such as a window or a door

5 The present invention relates to a drive mechanism for a closable opening such as a window or a door. Such mechanisms generally include an apertured drive rod attachable
10 to the movable element of the closable opening and a pinion meshing with the apertures of the drive rod and mounted in a housing which can be fixed in relation to the frame of the opening so that upon turning the pinion,
15 such as by means of a suitable key, the drive rod is displaced longitudinally to open or close the movable element of the opening.

A typical prior art mechanism of this type is described in German Utility Design
20 82 03 945.3, in which a shearoff web is provided on the pinion housing, which engages into a recess of the pinion to hold the mechanism in a selected preliminary position after the mechanism itself has been assembled but
25 before it is mounted on the door or window, so as to refrain the relatively movable components of the mechanism against movement prior to being fitted to the door or window. After this web has been sheared off it is
30 retained within the recess of the pinion so that it cannot escape from the recess and perhaps enter the mechanism to cause jamming or other failure of the mechanism.

However, this known solution to the problem of keeping the sheared-off web away from the moving parts of the mechanism necessitates a substantial structural outlay and a substantial precision, such as is applied in the building fittings field only where it is absolutely necessary.

The present invention seeks therefore to provide a simple releasable securing means which can hold the mechanism in the required position until the final assembly to the window or door, and can be released either upon
45 such assembly or upon first actuation of the drive mechanism in use.

According to its broadest aspect, therefore, the present invention provides a drive mechanism for a closable opening such as a window or door, comprising a guide rail, a drive rod guided by the guide rail and having a plurality of regularly spaced apertures, a pinion housing mounted on the guide rail and housing a
55 pinion having a plurality of teeth engageable in the apertures of the drive rod upon rotation of the pinion to cause longitudinal displacement of the drive rod with respect to the guide rail, the pinion having a shaped central opening for receiving a correspondingly shaped key by means of which the pinion is turnable, in which the pinion and drive rod are held in a selected preliminary position by releasable securing means which can be released upon final assembly of the mechanism
65

70 to a window, door or the like, or upon first operating the mechanism after installation, and in which the releasable securing means include an obstruction member which can be interposed between two relatively movable parts of the mechanism and which acts to prevent both rotation of the pinion and displacement of the drive rod with respect to the guide rail, the arrangement being such that
75 when release of the securing means is effected there are no sheared-off parts of the obstruction member retained within the mechanism.

In a first embodiment of the invention the obstruction member of the securing means comprises an element mounted on the pinion for rotation therewith and having a part which is engageable with the pinion housing but which can be disengaged from the pinion housing upon introduction of the shaped key into the shaped central opening in the pinion. Preferably, the releasable securing means comprise a securing slide carried by the pinion, the slide having an end part engageable
85 into a securing recess of the housing and an opening for receiving the said key, which at least partly coincides with the shaped central opening in the pinion such that upon the introduction of the said key into the said central opening the securing slide is displaced thereby to bring its opening into register with the central opening in the pinion and to withdraw its said end part from engagement in the securing recess of the housing. The arrangement of the securing means on the pinion in the region of the central hole has the advantage that a comparatively large amount of space is available at this point for the accommodation of the securing means, and
100 the securing means can be released in an extremely simple manner by a measure which is in any case necessary and unavoidable, namely the introduction of a key into the central hole of the pinion. In this embodiment
110 it is possible to re-engage the securing means by drawing the key out of the central hole in the pinion so that, after a repair or a trial run for example, the advantages of the securing means are available once more for retaining
115 the relatively movable parts of the mechanism in the selected position.

The securing slide may be provided with a resilient element which extends into the central opening of the pinion adjacent a lateral wall thereof and which resiliently biases the securing slide into engagement with the said securing recess in the pinion housing, the resilient element being engaged, upon insertion of the key in the pinion such as to
120 displace the said end part of the slide plate out of engagement with the securing recess of the housing against the biasing action of the resilient element. This ensures the re-engagement of the securing means and retention of the moving parts of the mechanism when the
130

key is withdrawn. In a preferred embodiment of the invention the resilient element is formed from the material of the securing slide by stamping out and bending the material to

5 form the said opening for receiving the key, and conveniently the pinion has a rectangular cross-section, the longer sides being longer than the shorter sides by the thickness of the resilient element.

10 These embodiments have a particularly simple construction whilst the number of components required is small. In an alternative embodiment, instead of a displaceable slide the mechanism is provided with one or more

15 shear pins. In such an embodiment the obstruction member of the securing means comprises at least one shear pin engageable in one of the apertures in the drive rod which in use of the mechanism are engaged by the

20 teeth of the pinion, which in the said preliminary position is out of engagement with the pinion, and an ejection hole is provided in the guide rail where a tooth of the pinion enters the said one of the apertures such as to eject

25 the sheared-off part of the shear pin upon turning the pinion with respect to the housing. With such ejection the sheared-off part of the pin is not retained in the mechanism but is ejected immediately the mechanism is operated, either in service or before installation

30 during a trial run for example.

In this embodiment temporary retaining means may be provided to retain the sheared-off part of the shear pin temporarily in the

35 aperture of the drive rod accommodating it after it has been sheared-off and before ejection. This ensures that the sheared-off part of the shear pin remains under control until it is ejected.

40 Two embodiments of the invention will now be more particularly described, by way of example, with reference to the accompanying drawings, in which:

45 *Figure 1* is a side elevation of a drive mechanism formed as a first embodiment of the invention;

Figure 2 is a section taken on the line II-II of *Fig. 1*;

50 *Figure 3* is a detail of the embodiment of *Figs. 1* and *2*;

Figure 4 is a side elevation of a drive mechanism formed as a second embodiment of the invention; and

55 *Figure 5* is a view in the direction of the arrow V of *Fig. 4* during the assembly of the securing means.

Referring first to *Figs. 1* to *3* of the drawings, there is shown a guide rail 10 guiding a drive rod 12. A pinion housing 14, which is attached to the guide rail 10, consists of two housing halves 14a and 14b which engage over the guide rail 10 by means of flanges 14c and 14d respectively and accommodate a pinion 16 between them. The pinion 16 has a

20 engage into apertures 22 in the drive rod 12. A securing slide 24 is guided slidably and non rotatably, namely by guide surfaces 26, on one face of the pinion 16. This securing slide 24 has a projection 28 which can engage into a securing recess 30 of the housing 14. A central opening 32 is stamped out of the securing slide 24, and the material stamped out to form the opening is bent to form a transverse resilient element 34 which abuts a side surface 18a of the central hole 18 in the pinion 16 when the securing slide 24 is fixed into its operative position.

In *Fig. 2* the projection 28 is shown engaged into the securing recess 30 so that the pinion 16, and therefore also the drive rod 12, is anchored against rotation. The drive rod 12 is located within the guide rail 10 in its central position, for example, so that it will automatically be centralised upon assembly. In this way the drive rod 12 is firmly secured within the guide rail 10 of the drive mechanism so that the drive mechanism itself can easily be assembled and connected in correct functional manner to adjacent fitting sub-assemblies without it being necessary to locate the relatively movable parts prior to assembly.

When a key, such as the key 36 shown in *Fig. 2*, is inserted into the central hole 18, the securing slide 24 is displaced to the right of *Fig. 2* and the projection 28 leaves its engagement with the securing recess 30. When the key 36 is withdrawn again, the projection 28 can re-engage into the securing recess 30 under the action of the resilient element 34. The securing means are thus automatically released upon insertion of the key 36.

In the embodiment of *Fig. 4*, analogous parts are designated by the same reference numerals, increased by the number 100 in each case. In this embodiment two shear pins 140 are attached to a common head plate 138. The shear pins 140 are inserted through respective abutment orifices 142 of the guide rail 110 and through respective passages 144 formed by matching recesses in the flanges 114c and 114d, and are a force fit in respective apertures, 146 of the drive rod 112. In its centre portion, between the two shear pins 140, the guide rail 110 has an ejection hole 148 which is aligned with an ejection orifice 150 in the head plate 138 of the two shear pins and with a passage 152 in the flanges 114c and 114d.

120 When a key (not shown) is inserted into the central hole 118 in the pinion 116 and the pinion 116 is rotated thereby, the two shear pins 140 are sheared off by relative movement between the drive rod 112 and the guide rail 110 so that the head plate 138 with the stumps of the shear pins 140 which have remained on it, then falls away freely or can be pulled off. The sections of the shear pins 140 which have remained in the apertures 122 are firmly held in these apertures

either because they were a force fit in the first place or because they are retained between facing surfaces of the guide rail 110 and the housing 114, and move with the drive rod

- 5 112 as it is slid by further rotation of the pinion 116. Let us assume that the pinion 116 is rotated counter clockwise as viewed in Fig. 4 and the drive rod 112 is moved upwards. The tooth 120a will eventually enter the region of that aperture 146 which accommodates the sheared-off part of the shear pin 140 through the ejection hole 148, then through the passage 152, and finally through the ejector orifice 150 into the open. A corresponding action occurs with the pin part sheared off from the upper shear pin 140 when clockwise rotary movement of the pinion 116 takes place.

- 20 Chamfers 154 are made on the inside of the head plate 138, which permit the head plate 138 to be pried up with a screwdriver or a finger nail so that the head plate 138 can be pulled off after shearing off of the shear pins 140 has occurred if it does not fall away freely. Should the necessity to release the securing non destructively arise, then the head plate 138 may be pulled off in the same manner, withdrawing the two shear pins 140 and allowing free movement of the mechanism.

- 30 It remains to be added, with reference to the embodiment described in relation to Figs. 1 to 3, that the re-establishment of security may be required, for example, where it is desired to make a trial run prior to final assembly of the mechanism in a closable opening. The possibility of a trial run within the context of a statistical production control is also possible with the embodiment of Figs. 40 4 and 5, in that a new support plate with shear pins can be fitted after a trial run has been performed and the sheared-off parts of the shear pins have been ejected.

45 CLAIMS

1. A drive mechanism for a closable opening such as a window or door, comprising a guide rail, a drive rod guided by the guide rail and having a plurality of regularly spaced apertures, a pinion housing mounted on the guide rail and housing a pinion having a plurality of teeth engageable in the apertures of the drive rod upon rotation of the pinion to cause longitudinal displacement of the drive rod with respect to the guide rail, the pinion having a shaped central opening for receiving a correspondingly shaped key by means of which the pinion is turnable, in which the pinion and drive rod are held in a selected preliminary position by releasable securing means which can be released upon final assembly of the mechanism to a window, door or the like, or upon first operating the mechanism after installation, and in which the releasable securing means include an obstruction member which can be interposed between two relatively movable parts of the mechanism and which acts to prevent both rotation of the pinion and displacement of the drive rod with respect to the guide rail, the arrangement being such that when release of the securing means is effected there are no sheared-off parts of the obstruction member retained within the mechanism.
2. A drive mechanism as claimed in Claim 1, in which the obstruction member of the securing means comprises an element mounted on the pinion for rotation therewith and having a part which is engageable with the pinion housing but which can be disengaged from the pinion housing upon introduction of the shaped key into the shaped central opening in the pinion.
3. A drive mechanism as claimed in Claim 1 or Claim 2, in which the releasable securing means comprise a securing slide means carried by the pinion, the slide having an end part engageable into a securing recess of the housing and an opening for receiving the said key, which at least partly coincides with the shaped central opening in the pinion such that upon the introduction of the said key into the said central opening the securing slide is displaced thereby to bring its opening into register with the central opening in the pinion and to withdraw its said end part from engagement in the securing recess of the housing.
4. A drive mechanism as claimed in Claim 3, in which the securing slide is provided with a resilient element which extends into the central opening of the pinion adjacent a lateral wall thereof and which resiliently biases the securing slide into engagement with the said securing recess in the pinion housing, the resilient element being engaged, upon insertion of the key in the pinion such as to displace the said end part of the slide plate out of engagement with the securing recess of the housing against the biasing action of the resilient element.
5. A drive mechanism as claimed in Claim 4, in which the resilient element is formed from the material of the securing slide by stamping out and bending the material to form the said opening for receiving the key.
6. A drive mechanism as claimed in Claim 4 or Claim 5, in which the said central opening in the pinion has a rectangular cross-section, the longer sides being longer than the shorter sides by the thickness of the resilient element.
7. A drive mechanism as claimed in any of Claims 2 to 6, in which the securing slide is guided slidably in a diametral groove on an end face of the pinion and has at one end a projection for engagement into the securing recess of the housing.
8. A drive mechanism as claimed in Claim 1, in which the obstruction member of the

- 70 112 as it is slid by further rotation of the pinion 116. Let us assume that the pinion 116 is rotated counter clockwise as viewed in Fig. 4 and the drive rod 112 is moved upwards. The tooth 120a will eventually enter the region of that aperture 146 which accommodates the sheared-off part of the shear pin 140 through the ejection hole 148, then through the passage 152, and finally through the ejector orifice 150 into the open. A corresponding action occurs with the pin part sheared off from the upper shear pin 140 when clockwise rotary movement of the pinion 116 takes place.
- 20 Chamfers 154 are made on the inside of the head plate 138, which permit the head plate 138 to be pried up with a screwdriver or a finger nail so that the head plate 138 can be pulled off after shearing off of the shear pins 140 has occurred if it does not fall away freely. Should the necessity to release the securing non destructively arise, then the head plate 138 may be pulled off in the same manner, withdrawing the two shear pins 140 and allowing free movement of the mechanism.
- 30 It remains to be added, with reference to the embodiment described in relation to Figs. 1 to 3, that the re-establishment of security may be required, for example, where it is desired to make a trial run prior to final assembly of the mechanism in a closable opening. The possibility of a trial run within the context of a statistical production control is also possible with the embodiment of Figs. 4 and 5, in that a new support plate with shear pins can be fitted after a trial run has been performed and the sheared-off parts of the shear pins have been ejected.
- 45 CLAIMS
1. A drive mechanism for a closable opening such as a window or door, comprising a guide rail, a drive rod guided by the guide rail and having a plurality of regularly spaced apertures, a pinion housing mounted on the guide rail and housing a pinion having a plurality of teeth engageable in the apertures of the drive rod upon rotation of the pinion to cause longitudinal displacement of the drive rod with respect to the guide rail, the pinion having a shaped central opening for receiving a correspondingly shaped key by means of which the pinion is turnable, in which the pinion and drive rod are held in a selected preliminary position by releasable securing means which can be released upon final assembly of the mechanism to a window, door or the like, or upon first operating the mechanism after installation, and in which the releasable securing means include an obstruction member which can be interposed between two relatively movable parts of the mechanism and which acts to prevent both rotation of the pinion and displacement of the drive rod with respect to the guide rail, the arrangement being such that when release of the securing means is effected there are no sheared-off parts of the obstruction member retained within the mechanism.
2. A drive mechanism as claimed in Claim 1, in which the obstruction member of the securing means comprises an element mounted on the pinion for rotation therewith and having a part which is engageable with the pinion housing but which can be disengaged from the pinion housing upon introduction of the shaped key into the shaped central opening in the pinion.
3. A drive mechanism as claimed in Claim 1 or Claim 2, in which the releasable securing means comprise a securing slide means carried by the pinion, the slide having an end part engageable into a securing recess of the housing and an opening for receiving the said key, which at least partly coincides with the shaped central opening in the pinion such that upon the introduction of the said key into the said central opening the securing slide is displaced thereby to bring its opening into register with the central opening in the pinion and to withdraw its said end part from engagement in the securing recess of the housing.
4. A drive mechanism as claimed in Claim 3, in which the securing slide is provided with a resilient element which extends into the central opening of the pinion adjacent a lateral wall thereof and which resiliently biases the securing slide into engagement with the said securing recess in the pinion housing, the resilient element being engaged, upon insertion of the key in the pinion such as to displace the said end part of the slide plate out of engagement with the securing recess of the housing against the biasing action of the resilient element.
5. A drive mechanism as claimed in Claim 4, in which the resilient element is formed from the material of the securing slide by stamping out and bending the material to form the said opening for receiving the key.
6. A drive mechanism as claimed in Claim 4 or Claim 5, in which the said central opening in the pinion has a rectangular cross-section, the longer sides being longer than the shorter sides by the thickness of the resilient element.
7. A drive mechanism as claimed in any of Claims 2 to 6, in which the securing slide is guided slidably in a diametral groove on an end face of the pinion and has at one end a projection for engagement into the securing recess of the housing.
8. A drive mechanism as claimed in Claim 1, in which the obstruction member of the

securing means comprises at least one shear pin engageable in one of the apertures in the drive rod which in use of the mechanism are engaged by the teeth of the pinion, which in the said preliminary position is out of engagement with the pinion, and an ejection hole is provided in the guide rail where a tooth of the pinion enters the said one of the apertures such as to eject the sheared-off part of the shear pin upon turning the pinion with respect to the housing.

9. A drive mechanism as claimed in Claim 8, in which temporary retaining means are provided to retain the sheared-off part of the shear pin temporarily in the aperture of the drive rod accommodating it after it has been sheared-off and before ejection.

10. A drive mechanism as claimed in Claim 8 or Claim 9, in which the shear pin is inserted from the outside through an abutment orifice of the guide rail into an aperture of the drive rod and is simultaneously accommodated by this abutment orifice and by the aperture of the drive rod.

11. A drive mechanism as claimed in Claim 10, in which the pinion housing is fixed to the guide rail by the use of flanges abutting the outside of the guide rail, these flanges being provided with notches which define passages in alignment with the abutment orifice and/or with the ejection hole of the guide rail.

12. A drive mechanism as claimed in any of Claims 8 to 11, in which the shear pin is provided with a head part which abuts the outside of the guide rail and/or the outside of the fastening flanges.

13. A drive mechanism as claimed in any of Claims 8 to 12, in which two shear pins are provided, both being attached to a common head part which abuts the outside of the guide rail or the outside of the fastening flanges and itself has an ejection hole in alignment with the ejection hole in the guide rail.

14. A drive mechanism as claimed in any of Claims 9 to 13, in which the temporary retaining means operate so that the sheared-off part of the shear pin present in an aperture of the drive rod is retained by a force fit in the aperture until it enters the region of the ejection hole for the first time.

15. A drive mechanism as claimed in any of Claims 9 to 14, in which the temporary retaining means of the guide rail and/or the pinion housing are in the form of masking surfaces covering the apertures of the drive rod.

16. A drive mechanism as claimed in any of Claims 8 to 15, in which the ejection hole is located at a position along the guide rail where each tooth of the pinion projects most deeply into the associated aperture of the drive rod thereby ejecting the sheared-off part of the shear pin upon first turning the pinion

after assembly.

17. A drive mechanism as claimed in any of Claims 8 to 16, in which the shear pin is nondestructively removable from the outside of the guide rail.

18. A drive mechanism substantially as hereinbefore described with reference to Figs. 1, 2 and 3 or to Figs. 4 and 5 of the accompanying drawings.

19. Any novel integer or step, or combination of integers or steps, hereinbefore described and/or shown in the accompanying drawings irrespective of whether the present claim is within the scope of, or relates to the same or a different invention from that of, the preceding claims.

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